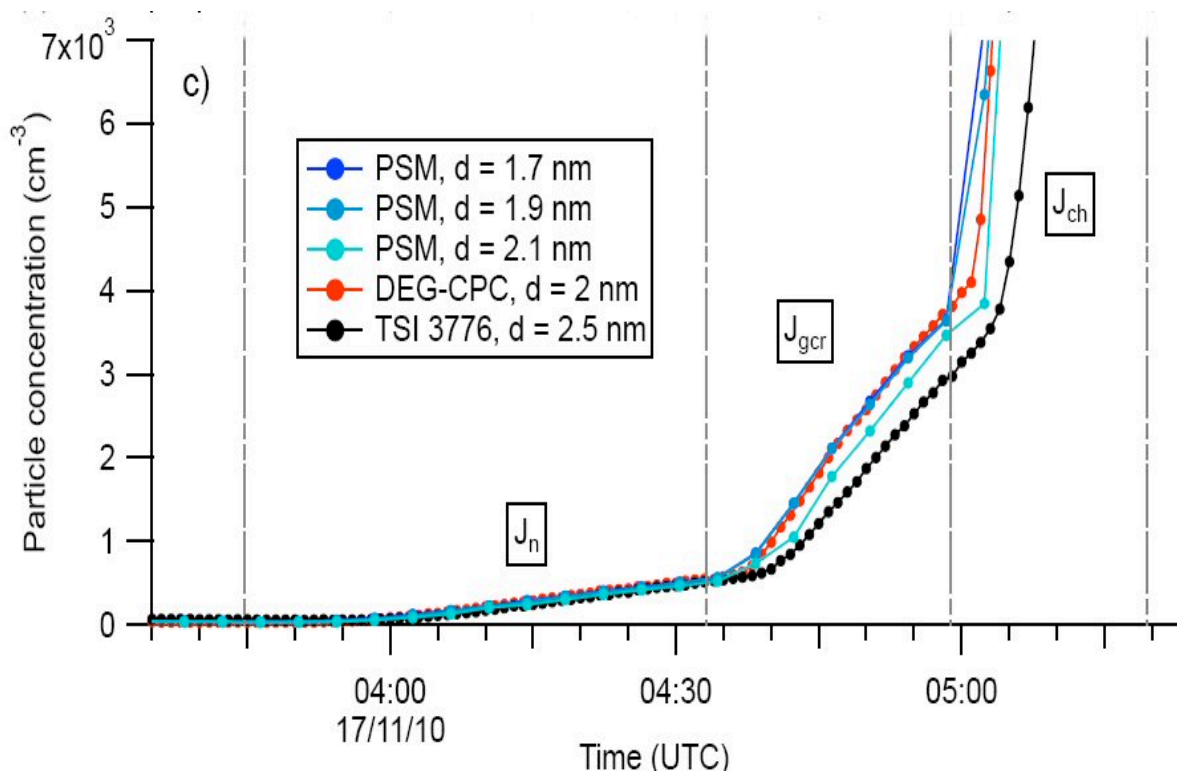


## CERN's hidden CLOUD graph, and what it demonstrates



Source: Fig. S2c from supplementary online material for J. Kirkby et al., Nature, 476, 429-433, © Nature 2011

The graph above does not appear in the print edition of Nature, but it does make showing at the back of the online supplementary material. The graph shows how cosmic rays promote the formation of clusters of molecules that can then grow and seed clouds in the real atmosphere.

At 03.45 am in a CLOUD experiment in Geneva, ultraviolet light began to create molecules in the cloud chamber, which approximates the air in the atmosphere. J<sub>n</sub> above shows the neutral phase of the experiment, during which the CLOUD experiment electrically removed ions and molecular clusters. At 4.33 am, the CLOUD experiment stopped the electrical removal and allowed natural galactic cosmic rays (J<sub>gcr</sub>) to enter the chamber through the roof of the Geneva building, leading to a faster rate of cluster buildup.

Then, at 4.58 am, CLOUD also beamed charged pion particles (J<sub>ch</sub>) from an accelerator (these are equivalent to cosmic rays), the rate of cluster production took off, convincingly demonstrating the effect of cosmic rays on cluster growth.

In the graph above, the different colours show the different diameters of the clusters in nanometres. The blue clusters, which are smallest, grew fastest; the black ones, which are the largest, took the most time.